Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules Regarding Dedicated Short-Range Communication Services in the 5.850-5.925 GHz Band (5.9 GHz Band)'	)	WT Docket No. 01-90
	)	
Amendment of Parts 2 and 90 of the Commission`s Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of .Intelligent Transportation Services	)	ET Docket No 98-95 ✓ RM-9096

NOTICE OF PROPOSED RULEMAKING AND ORQER

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By the Commission:

Comment Due Date: 60 days after Federal Register publication1
Reply Comment Due Date: [90 days after Federal Register publication]

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[1] The Commission opened WT Docket No. 01-90 under the following caption: "Intelligent Transportation System Applications Using Dedicated Short-Range Communications." *See, e.g., Order*, WT Docket No. 01-90. 15 FCC Rcd 5558 (2001). We are today revising the caption of this docket to more accurately reflect the scope of this proceeding.

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I. INTRODUCTION AND EXECUTIVE SUMMARY

1. In this *Notice of Proposed Rulemaking and Order (Notice and Order),* we propose service rules to govern the licensing and use of the 5.850-5.925 GHz band (5.9 GHz band) for Dedicated Short-Range Communications (DSRC) services in the Intelligent Transportation System (ITS) radio service.[1] Specifically in this Notice *and Order:*

- We propose to permit entities providing public safety DSRC operations to use the 5.9 GHz band.
- For public safety entities, we propose to apply the application. licensing and processing rules under Part 90 of the Commission's Rules.

2. We generally seek comment on the following issues:

- whether to license Roadside Units (RSUs) by site or geographic area
- whetherto permit non-public safety radio DSRC operations in the 5.9 GHz band:
  - In the event that we allow non-public safety radio applications in the 5.9 GHz band and in the event that the licensing scheme we select for those ITS applications results in mutually exclusive licenses, we propose to apply competitive bidding procedures under the Commission's Part 1 competitive bidding rules.
- the definition of public safety in the context of ITS:
- the definition of Dedicated Short-Range Communication Service (DSRCS);
- the interoperability necessary for DSRC operations and how this interoperability should be achieved;
- whether *to* license On Board Units (OBUs) associated with fixed systems under the associated RSU license.
- whether the OBUs not associated with a fixed system should be licensed by rule or unlicensed under Part 15.
- the appropriate licensing scheme or schemes for this band;
- various channelization plans;
- various technical matters; and
- use of this band in Mexican and Canadian border areas

[2] See 47 C.F.R Part 90, Subpart M

3. Dismissal of Petitions for Reconsideration. Further, we also seek comment on issues raised by two Petitions for Reconsideration or Clarification of the ***Allocution Report and Order.'*** PanAmSat sought reconsideration of the Commission's decision that prior coordination between DSRC operations applications and Fixed Satellite Service (FSS) uplinks is unnecessary.' Mark IV Industries sought reconsideration or clarification of the power levels and emission mask requirements established in the ***Allocation Report and Order***.[5] We dismiss these two petitions for reconsideration as moot because we are seeking comment on the issues raised through this through this ***Notice,*** and, with the benefit of a fuller record, will address those issues in this proceeding, *i.e.*, WT Docket 01-90.

II. BACKGROUND

A. Creation of ITS

4. The ITS[6] program, a national program administered by the United States Department of Transportation (DOT), was created by Congress in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).[7] The goals[8] of the ITS program are challenging and ambitious: the ITS program incorporates technology and advanced electronics[9] into the nation's surface transportation infrastructure to improve traveler safety. decrease traffic congestion. facilitate the reduction of air pollution. and conserve vital fossil fuels." To accomplish these goals, ISTEA required DOT to "promote *compatibility*

[3] Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services. ET Docket No. 98-95, ***Report and Order,*** 14 FCC Rcd 18221 (1999) ***(Allocation*** Report ***and Order).***

[4] PanAmSat Corporation, Petition for Reconsideration or Clarification (filed Dec. 27, 1999)(PanAmSat Petition).

[5] Mark IV Industries, Limited, I.V.H.S. Division, Petition for Clarification (filed Dec. 27. 1999)(Mark IV Petition).

[6] Originally entitled "Intelligent Vehicle Highway Systems" ("IVHS"). See Intermodal Surface Transportation Efficiency Act of 1991, Pub. L. 102-240. 105 Stat. 1914 (1991) (ISTEA).

[7] ISTEA at § 6051

[8] ***See*** ISTEA at § 6052(b)

[9] Section 6059 of ISTEA defines ITS as:

> The development or application of electronics. communications. or information processing (including advanced traffic management systems, commercial vehicle operations. advanced traveler information systems, commercial and advanced vehicle control svstems. advanced public transportation systems. satellite vehicle tracking systems. and advanced vehicle communications systems) used singly or in combination to improve the efficiency and safety of surface transportation systems

[10] In 1998, DOT explained the ITS program as follows:

> Surface transportation systems – the networks of highways. local streets. bus routes, and rail lines – are the ties that bind communities and facilitate commerce. connecting businesses and residents to work. homes, schools. services, and each other. During the past 20 years, however, transportation svstems have struggled to keep pace with Americans' growing and changing travel needs. The General Accounting Office has projected that congestion in metropolitan areas could worsen by 300 to 400 percent over the next 15 years unless significant changes are made.

(continued...)

among intelligent [transportation] technologies throughout the States" [emphasis supplied]." In response to Congressional authorization to use an advisory committee." DOT selected the Intelligent Transportation Society of America (ITS America)[13] as its Federal Advisory Committee'' on ITS matters.

B. Development of ITS

5. After the passage of ISTEA. in 1991, DOT began to develop and deploy ITS." In doing so, DOT states that it worked with many public and private partners throughout the United States. including ITS America.[16] In 1993, DOT, its partners, and ITS America started to develop a national architecture,"

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> Transportation in the aggregate. particularly when affected by these factors, poses an environmental threat as well. Finally, traffic accidents now claim more than 41,000 lives each year. Congress has decided to add new tools to the transportation system. Rather than continuing to rely simply upon quantitative additions to the existing transportation infrastructure, Congress has chosen to also emphasize the use of technology to improve the performance of that infrastructure.

United States Department of Transportation Comments to ET Docket No. 98-95 at 2 (DOT Comments)

[11] Section 6053(b) of ISTEA states:

> The Secretary shall develop and implement standards and protocols to promote the widespread use and evaluation of intelligent vehicle-highway systems technology as a component of the Nation's surface transportation systems. To the extent practicable, such standards and protocols shall promote compatibility among intelligent vehicle-highway systems technologies implemented throughout the States. In carrying out this subsection. the Secretary may use the services of such existing standards-setting organizations as the Secretary determines appropriate.

[12] ISTEA at § 6053(e)

[13] ITS America, a Federal Advisory Committee to DOT. was first organized in 1991 and is a non-profit, educational association. Its members are drawn from the business. academic, and government sectors. ITS America has over 600 members. Over 350 of its members represent corporations involved in providing transportation of goods and services. 135 members represent federal. state. and municipal transpotlation agencies. and 50 members represent research institutions and universities. *See* Status Report on Licensing and Service Issues and Deployment Strategies for DSRC-Based Intelligent Transportation Services in the 5.850-5.925 GHz Band (filed by ITS America on Oct. 6.2000) at 4-5 (Status Report). See Ex *Porte* Comments of the Intelligent Transportation Society of America: Status Report and Recommendations for Licensing and Service Rules for the DSRC Spectrum in the 5850-5925 MHz Band from Mark D. Johnson, Squire, Sanders & Dempsey to Federal Communications Commission at 19 (filed July 9, 2002) (July Ex *Parte* Comments).

[14] See Federal Advisory Committee Act. P.L. 92-463, 86 Stat. 770 (1972) *codified at 5* U.S.C. Appendix 2.

[15] DOT Comments at 2

[16] *Id.*

[17] The Transportation Equity Act for the 21st Century (EA-21) subsequently required the use of the National Architecture. Section 5206(a) of TEA-21 states:

> Consistent with section 12(d) of the National Technology and Advancement Act of 1995 . . ., the Secretary shall develop. implement and maintain a national architecture and supporting standards and protocols to promote the widespread use and evaluation of intelligent transportation system technology as a component of the surface transportation systems of the United States.

(continued....)

an organized approach to implementing ITS services." The National Architecture is designed to ensure the development of a seamless, multimodal. ITS system across the country; in essence. it is a master plan or a framework for the deployment of ITS technologies and systems for the next twenty years." Completed in 1996, and amended from time-to-time. the National Architecture[20] currently identifies thirty-two ITS User Services," which are divided into one or more of the eight User Service Bundles." Furthermore, the National Architecture identifies five communication linkages as necessary for one or more of these User Services: wide area broadcast, wide area two-way wireless, DSRC, vehicle-to-vehicle communication, and wireline communication." The National Architecture identifies DSRC as critical for deploying many ITS User Services;[24] such uses are generally called DSRC-based ITS applications.[25] In

(Continued from previous page)

Transportation Equity Act for the 21st Century, Pub. L. 105-178, 112 Stat. 107 at § 5206(a) (1998) (TEA-21).

[18] U.S. Department of Transportation, Intelligent Transportation Systems. The National Architecture for ITS: A Framework for Integrated Transportation into the 21" Century (1996) at 2.

[19] *Id.*

[20] The National Architecture establishes the types of information and communication that are needed to support various ITS services, how data should be shared and used by which physical entities, and the types of standards that are needed to facilitate sharing of information. ITS relies on the interaction among three "layers" of infrastructure, the transportation layer. the communications layer. and the institutional laver. The transportation layer is the physical ITS infrastructure composed of travelers, vehicles. and roadside equipment. The communications layer is the information infrastructure that connects elements of the transportation layer, thus allowing coordination and sharing among systems and people. The institutional layer is composed of organizations. *Id.* at 4.

[21] ITS America states that as "expected use of the band increases in the future, new and unforeseen applications will be deployed consistent with the ITS User Service Bundles." *See* July *Ex Parte* Comments at 24.

[22] July *Ex Parte* Comments at 6, 24-25. The eight User Service Bundles are as follows: (1) Travel and Traffic Management comprised of Probe Data Collection. and Traffic Information; (2) Maintenance Construction Operations, comprised of In-Vehicle Signing (Work Zone Warning. Highway/Rail Intersection Warning. and Road Condition Warning); (3) Public Transit Management. comprised of Transit Vehicle Data Transfer (gate and yard) and Transit Vehicle Signal Priority, (4) Electronic Payment. comprised of Toll Collection, Gas Payment. Drive-Thru Payment, Rental Car Processing, and Parking Lot Payment; (5) Commercial Vehicle Operations (CVO). comprised of Main Screening, Border Clearance. CVO Driver's Daily Log; Unique CVO Fleet Management. and CVO Truck Stop Data Transfer ; (6) Emergency Management. comprised of In-Vehicle Signing (Work Zone Warning, Highway/Rail Intersection Warning, and Road Condition Warning), On-Board Safety Data Transfer. Vehicle Safety Inspection, Emergency Vehicle Video Relay, and Emergency Vehicle Approach Warning; and (7) Advanced Vehicle Safety Systems, comprised of Intersection Collision Avoidance. In-Vehicle Signing (Work Zone Warning Highway/Rail Intersection Warning. and Road Condition Warning), Vehicle-to-Vehicle (Vehicle Stopped or Slowing, Vehicle/Vehicle Collision Avoidance. and Imminent Collision Warning). Rollover Warning. and Low Bridge Warning; and (8) Information Management comprised of Maim Screening. Border Clearance. Access Control Rental Car Processing. Unique CVO Fleet Management. CVO Truck Stop Data Transfer. Locomotive Fuel Monitoring, and Locomotive Data Transfer. See also Appendix B for a list of DSRC-based ITS applications in the 5.9 GHz band.

[23] United States Depamnent of Transportation. *supra* note 18, at 6. ITS America states the at the 5.9 GHz band is not intended to support all ITS applications. *See* July *Ex Parte* Comments at 23.

[24] U.S. Department of Transportation, *Background: DSRC Allocation to Support Intelligent Transportation Systems* (Apr. 1997) at http://www.its.dot.gov/tcomm/dsrcbk.htm.

[25] See Status Report at 5-6.

this connection, ITS America states that DSRC is particularly useful for User Services that require "high-reliability real-time data communications with a rapidly moving vehicle."[26]

C. Creation of ITS Radio Service and Allocation of the 5.9 GHz band to DSRC-based ITS Services

6. In 1997, ITS America petitioned the Commission to allocate seventy-five megahertz of spectrum in the 5.9 GHz band for ITS, in particular for DSRC." The petition noted that although DSRC-based ITS systems had been deployed in the Location and Monitoring Service in the 902-928 MHz band. that band "is simply too small and too congested to support the many DSRC applications contemplated in the National Architecture.[28]

7. In 1998, Congress passed and the President signed into law the Transportation Equity Act for the 21" Century (TEA-21).[29] TEA-21, the successor to ISTEA, reauthorized the national ITS program." with two changes relevant here. First, TEA-21 directed the Commission. in consultation with DOT. to consider the spectrum needs "for the operation of intelligent transportation systems, including spectrum for the dedicated short-range vehicle-to-wayside wireless standard."" DSRC. TEA-21 directed the Commission to complete a rulemaking considering the allocation of this spectrum by January 1, 2000.[32] Second, TEA-21 directed DOT to promote. through the National Architecture. *interoperability*[33] among

[26] *Id.* at 8.

[27] ITS America Petition for Rulemaking RM 9096. ET Docket No. 98-95 at 1 (filed May 19. 1997)(ITS America Allocation Petition).

[28] *Id.* at ii

[29] *See supra* n. 17.

[30] According to ITS America, from 1991-2003, Congress has authorized $4 billion for the National ITS Program. July *Ex Parte* Comments at 4.

[31] Section 5206(f) of TEA-21 states:

> The Federal Communications Commission shall consider. in consultation with the Secretary, spectrum needs for the operation of intelligent transportation svstems. including spectrum for the *dedicated short-range vehicle-to-wayside wireless standard.* Not later than January 1.2000. the Federal Communications Commission shall have completed a rulemaking considering the allocation of spectrum for intelligent transportation systems.

(emphasis supplied).

[32] ***Id.***

[33] Section 5206(a) of TEA-21 states

> (2) Interoperability and efficiency.—To the maximum extent practicable. the national architecture shall promote interoperability among. and efficiency of, intelligent transportation system technologies implemented throughout the United States.
>
> (3) Use of standards development organizations.—In carrying out this section. the Secretary may use the services of such standards development organizations as the Secretary determines to be appropriate.

ITS technologies implemented throughout the United States [emphasis supplied]. In addition. TEA-21 requires that all federal funds used to deploy ITS technologies conform to the National Architecture."

8. In October 1999. the Commission released the ***Allocution Report and Order*** allocating the ***5.9*** GHz band for DSRC-based ITS applications and adopting basic technical rules for DSRC operations The Commission noted that the 5.9 GHz band was appropriate for DSRC operations "due to its potential compatibility with European and Asian DSRC developments."[35] The Commission also amended[36] Subpart M of Part 90, the Intelligent Transportation Radio Service (ITS radio service)" to include the DSRC service in addition to the Location and Monitoring service.[38] Both the LMS service and the DSRC

[34] Section 5206(e)(1) of TEA-21 *states:*

> Except as provided in paragraphs (2) and (3), the Secretary shall ensure that intelligent transportation system projects carried out using funds made available from the Highway Trust Fund, including funds made available under this subtitle to deploy intelligent transportation system technologies, conform to the national architecture. applicable standards or provisional standards, and protocols developed under subsection (a).

[35] ***Allocation Report and Order.*** 14 FCC Rcd at 18221¶ 7. The Commission further stated:

> The European Road Transport and Traffic Telematics ("RTTT") pre-standard consists of 10 megahertz at 5.795-5.805 GHz with an additional 10 megahertz available on a national basis at **5.805-5.815** GHz and recommends that this spectrum be made available on an exclusive basis to avoid interference. *However,* the European pre-standard allows for 5 megahertz *channel* pairs and is intended to provide far fewer applications than planned for m the National ITS Architecture for the U.S. Further, the European pre-standard states that future applications may require expansion of the available spectrum at 5.8 GHz. The Japanese pre-standard for DSRC applications plans to make 60 megahetz of spectrum available in the ***5.8*** GHz range *on* an exclusive basis. Further, the Japanese standard uses 10 megahetz channels in order to convey large amounts of data to fast moving vehicles as they pass through small communication areas.

Allocation Report and Order, **11** FCC Rcd 18221, 18225-18226¶ 10 (citations omitted).

Since the ***Allocation Report and Order.*** ITS America reports that Industry Canada is in the process of allocating the 5.855-5.925 GHz for DSRC operations. that additional spectrum in the 5.805-5.815 GHz band might be made available for DSRC operations in Europe, that Japan has made the 5.77-5.85 GHz band available for DSRC operations. and that Singapore and South Korea have made the 5.8 GHz Industrial, Scientific. and Medical (ISM) band available for DSRC operations. July *Ex* Parte Comments at 17.

[36] *See Allocation Report and Order*, **14** FCC Rcd 18221 at ¶ 1

[37] The Transportation Infrastructure Radio Service was created in 1995. See Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems. PR Docket No. 93-61, ***Report and Order,*** 10 FCC Rcd 1695,1698¶ 6 (1995)(***LMS Report and Order).*** In 1997 the Transportation Infrastructure Radio Service (TIRS) was renamed the Intelligent Transportation System radio service. See Amendment of Part 90 of the Commission Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems. PR Docket No. 93-61. ***Memorandum Opinion and Order and Further Notice of Proposed Rulemaking,*** 12 FCC Rcd 13942. 13944¶ 2 (1997).

[38] The Location and Monitoring Service (LMS) operates in the 902-928 MHz band. It includes both multilateration and non-multilateration systems. Multilateration LMS systems "use spread spectrum technology to locate vehicles or other moving objects with great accuracy throughout a wide geographic area." Non-multilateration LMS systems "use narrowband technology to transmit data to and from vehicles passing through a particular location." ***LMS Report and Order.*** 10 FCC Rcd 4695.4697 ¶ 4.

service seek "to develop and implement . . . intelligent transportation systems"[39] by integrating "radio-based technologies into the nation's transportation infrastructure."[40] The Commission deferred consideration of licensing and service rules and spectrum channelization plans to a later proceeding because the standards addressing those matters were still being developed by DOT.[41] Specifically, the Commission invited "the ITS industry and the DOT to consider the spectrum requirements of various DSRC applications and recommend a spectrum channelization plan."[42] The Commission further found that "DSRC operations must comply with the RF safety guidelines contained in the *Second Memorandum Opinion* and *Order* . . . in ET Docket No. 93-62."[43] A brief overview of the allocation of the 5.9 GHz band follows.

D. Table of allocations; Part 90 Intelligent Transportation Radio Service

9. Internationally, the 5.9 GHz band is allocated on a primary basis for Fixed Satellite Service ("FSS") Earth-to-space links ("uplinks") Fixed, and Mobile Services.[44] It is further designated internationally for industrial, scientific, and medical (ISM) applications.[45] In Region 2 it is also allocated on a secondary basis to the Amateur radio service and the Radiolocation service.[46] Domestically,[47] it is designated on a co-primary basis for DSRC operations," the Government's Radiolocation Service (*i.e.*, for use by high-powered military radar systems) and for non-Government Fixed Satellite Service (FSS) uplink operations. To ensure that mobile operations in 5.9 GHz band are ITS related, the Commission adopted footnote NGI 60 to the Table of Frequency Allocations to read as follows:

> NG160 In the 5850-5925 MHz band, the use of the non-Federal government mobile service is limited to Dedicated Short-Range Communications operating in the Intelligent Transportation System radio service.[49]

E. ITS America Status Report and Responsive Public Comments

10. On October 6, 2000, ITS America filed a "Status Report."[50] on licensing and service rules and deployment strategies for DSRC, describing its consensus building activities, identifying issues, and

[39] 47 C.F.R. § 90.350.

[40] Id.

[41] *Allocation Report and Order*, 14 FCC Rcd 18221 at ¶ 1.

[42] *Id.* at 18231 ¶ 22.

[43] *Id.* at 18231 ¶ 27.

[44] See 47 C.F.R. § 2.106, Table of Frequency Allocations.

[45] See *id.*

[46] See *id.*

[47] See *id.*

[48] *See Allocation Report and Order*, 14 FCC Rcd 18221, 18227 ¶ 12.

[49] 47 C.F.R. § 2.106, Table of Frequency Allocations.

[50] See n. 13, *supra*.

setting forth the candidate technologies under consideration for DSRC-based ITS applications. The Wireless Telecommunications Bureau (Bureau) subsequently released a *Public* Notice" seeking information from the public on the issues presented and discussed in the Status Report Shortly thereafter, to assist in developing licensing and service rules for DSRC-based ITS applications, the Commission opened the captioned docket and placed the Status Report and related documents on the Electronic Comment and Filing System." Eight comments and four reply comments were received.[53]

F. July Ex Purte Comments

11. On July 9, 2002, ITS America filed Ex Parte Comments" in which it proposed recommendations regarding the licensing and service rules. Those recommendations, discussed below, include a recommendation for the Commission to adopt a single wireless transmission standard.[55] ASTM E2213-02, Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems – 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) (ASTM-DSRC Standard), for all DSRC operations and equipment using the 5.9 GHz band.[56]

III. DISCUSSON

A. The DSRC service

12. Backaround. As discussed above, the Commission designated the 5.9 GHz band for "Dedicated Short-Range Communications operating in the Intelligent Transportation Radio Service."" The DSRC service is defined in Section 90.7 of the Commission's Rules as:

> [t]he use of non-voice radio techniques to transfer data over short distances between roadside and mobile radio units, between mobile units, and between mobile and portable units to perform operations related to the improvement of traffic flow, traffic safety, and other intelligent transportation service applications in a variety of public and commercial

[51] Wireless Telecommunications Bureau Seeks Comment Regarding Intelligent Transportation System Applications Using Dedicated Short Range Communications. *Public Notice*, DA 01-686 (WTB PSPWD rel. Mar. 16,2001)(corrected Mar. 22,2001).

[52] See Wireless Telecommunications Bureau Announces That Record Regarding "Status Report on Licensing and Service Issues and Deployment Strategies for DSRC-Based Intelligent Transportation Services in the 5.850-5.925 GHz Band" is Available on the Electronic Comment Filing Systems (ECFS), *Public* Notice, 16 FCC Rcd 8821 (PSPWD WTB 2001).

[53] See Appendix C

[54] *See supra* n. 13.

[55] ITS America reports that a nationwide Canadian standard. the "Spectrum Management. Radio Standard, Location and Monitoring Service" is expected to be adopted and would include the same channelization plan specified in the ASTM-DSRC Standard. In Europe the Comité de Normalisation has developed a set of DSRC standards, including the Physical Layer (L1). Data Link Layer (L2) and Application Layer (L7). Japan has developed a national DSRC standard designated ARIB T-55 and a new generation designated ARIB T-75." July *Ex Parte* Commentsat 17-18.

[56] July *Ex Parte* Commmts at ii

[57] *Allocation Report and Order*, 14 FCC Rcd 18221. 18227 ¶ 12.

environments. DSRC systems may also transmit status and instructional messages related to the units involved.[58]

13. The following is a brief description of DSRC-based ITS applications as submitted by ITS America. DSRC-based ITS applications vary by category (public safety or private radio), by range (less than fifty feet, 50-300 feet, 300-1100 feet, and 1000-3000 feet)[59] and by vehicle type (all vehicles, buses. trains, heaw trucks, and emergency vehicles).[60] DSRC operations will use short-range. low-power data transmissions of limited duration.[61] DSRC operations involve the following two types of DSRC devices: a Roadside Unit (RSU) and an On-Board Unit (OBU).[62] *An* RSU is a DSRC transceiver and is normally mounted along a road or a pedestrian passageway.[63] It may also, however, be mounted on a vehicle or be hand carried, but may only operate when stationary.[64] This portability will be for uses that are temporary, such as work zone warnings. *An* OBU is a DSRC transceiver that is mounted in or on a vehicle or it may be hand carried;[65] a portable OBU might be used at the scene of a car crash. *An* OBU can be operational while in motion or *stationary."* According to ITS America. the majority of DSRC-based ITS wireless transmissions will occur either between vehicles or between a moving vehicle and a fixed transmitter in a line-of-sight, point-to-point, or point-to-multipoint configuration.[67] In many instances, ITS America states, the vehicle will be traveling at highway speeds and will quickly pass through the "communications zone" of a fixed transmitter.[68] ITS America states that it is estimated that the data rate must be at least six Mbs to ensure reliability.[69]

14. Discussion,. Since the Allocation *Report* and *Order* was released. we note that the number and kinds of DSRC-based ITS applications have changed and continue to evolve.[70] Therefore, we seek comment on whether the definition of "Dedicated Short-Range Communications Service," originally adopted in the Allocation *Report* and *Order,* adequately covers the communication needs for all of the

[58] 47 C.F.R. § 90.7. *See also* 17 C.F.R. § 90.371

[59] ITS *America,* Proposed North American 5.9 GHz Band Plan at 3 (filed Sept. 21.2001) (First Proposed Band Plan).

[60] *Id*

[61] July *Ex Parte* Comments at 48.

[62] ITS America, 5.9 GHz DSRC Band Plan and Rules Proposal at 10 (filed Jan. 23.2002) (Second Proposed Band Plan).

[63] *Id.* at 11.

[64] Id.

[65] *Id.* at 13.

[66] *Id.*

[67] July *Ex Parte* Comments at 27.

[68] *Id.*

[69] Id. at 28.

[70] See Appendix B for a current list of ITS DSRC-based ITS applications.

DSRC-based ITS applications envisioned by the ITS community. For instance. we seek comment on whether transferring "data" would encompass the video and audio component of the "Emergency Vehicle Video Relay" application, a new application added by ITS America."

15. In the July Ex Parte Comments, ITS America notes that it is expected that the OBU would be able to convert certain types of data transmissions into voice messages using a variety of methods. including Voice-over-IP, Voice XML, or another packet radio technique, which would "store and forward the message." This technique would be used in the "Road Condition Waning" application in which a transportation agency would transmit, for example, a travel advisory warning drivers that they may encounter ice or other slippery conditions.[73] ITS America argues that this "store and forward' technique should not be construed as real-time, two-way communication, and thus. ITS America recommends that the word "non-voice" be deleted from the definition of DSRC.[74] In this connection. we note that real-time "voice" might be a component of some DSRC-based ITS applications. such as Emergency Vehicle Video Relay. Accordingly, we seek comment on ITS America's recommendation.

16. Several commenters to the *Public* Notice commented on whether the DSRC service should include "intelligent transportation service applications in a variety of . . . commercial environments."[75] One commenter states that "it is not unreasonable to assume that the market for . . . private and commercial uses will emerge more quickly and potentially could be larger than the requirements of public safety users."[76] Others disagree, and maintain that the 5.9 GHz band will be fully loaded with public safety and private radio DSRC-based ITS applications." In this connection. ITS America recommends that we replace the phrase "and commercial environments" with the phrase "and private environments."[78] According to ITS America, this change permits both "private radio and commercial entities providing such services . . . to play an important role in the deployment of DSRC-based ITS applications."[79] ITS America further maintains that such an amendment to the definition of DSRC service is necessary because "the DSRC spectrum is neither suitable for nor intended for cellular-based commercial applications such as CMRS [Commercial Mobile Radio Service[80]]."[81] In light of the concerns of ITS

[71] *Id.*

[72] July *Ex Parte* Comments at 26-27.

[73] Id. at 27.

[74] Id. at 27.

[75] *See* supra para. 12.

[76] Mark IV Industries Comments at 6.

[11] See TransCore Corporation Comments at 2. *See also* Federal Signal Corporation Comments at 2.

[78] ITS America Comments at 6

[79] Id. at 5.

[80] According to the Commission's Rules "Commercial Mobile Radio Service" is a mobile service that is:

(a)--
(1) provided for profit, *i.e.*, with the intent of receiving compensation or monetary gain:
(2) An interconnected service; and
(3) Available to the public. or to such classes of eligible users as to be effectively available to a substantial portion of the public: or

(continued...).

America and because of the continuing development of DSRC-based ITS applications and to promote the flexible use of the band, we propose to amend the definition of DSRC service by deleting the phrase "of public and commercial" from Section 90.7 and 90.371(a) of the Rules;[82] thus, these sections would read "a variety of environments." We seek comment on the proposal. Commenters should note that this issue is directly related to the issue of eligibility, which is discussed below. While commercial uses are not specificallv addressed below, we seek comment on whether commercial uses should be permitted in the 5.9 GHz band.

B. Eligibility

17. Background. ITS America recommends that the 5.9 GHz band "be designated for shared public safety and private services"[83] ITS America maintains that such shared use "will ensure that the band is put to its best and highest use for the greatest public benefit."[84] In this connection, ITS America notes that permitting private radio services in the 5.9 GHz band is necessary to achieve national interoperability of DSRC services.[85] Nonetheless. ITS America reports that there is consensus that public safety will be domiuant in the band and should be given priority over private transmissions." Below. we discuss ITS America's specific recommendation along with comments that we received on this issue.

1. Public safety uses

18. As mentioned above, we received several comments on who should be eligible to use the 5.9 GHz band. In assessing how the 5.9 GHz band should be used and by whom, we considered ISTEA, TEA-21, as well as the Communications Act of 1934, ITS America's First[87] and Second" Proposed Band Plans, the Status Report, the comments to the Public *Notice*, and the July Ex *Parte* Comments Most importantly, however, we considered statutory language. The intent of Congress, as stated in Section 6059 of ISTEA, is "to improve the efficiency and safety of surface transportation systems."[89] TEA-21 reaffirmed this Congressional intent when it stated that one of the goals of the national ITS program was to enhance the safe operation of motor vehicles, particularly by reducing the number and severity of collisions.[90] In addition, we note that statistics compiled by DOT demonstrate the need for dramatic

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(b) The functional equivalent of such a mobile service described in paragraph (a) of this section

17 C.F.R. § 20.3.

[81] ITS America Comments at 5. *See also* July *Ex Parte* Comments at 17

[82] 47 C.F.R. §§ 90.7 and 90.371(a)

[83] July Ex *Parte* Comments at 38 *citing Allocation Report and Order*, 14 FCC Rcd at 18236.

[84] *Id.* at 39

[85] *See infra* para 22

[86] July Ex *Parte* Comments at 38

[87] *See supra* n. 59

[88] *See supra* n. 62

[89] ISTEA at § 6059

[90] TEA-21 at § 5203(a)(2).

improvement in the safety of the nation's surface transportation system. In 1999. there were 6.279.000 motor vehicle crashes in which 41,611 people were killed" and 3.236,000 people were injured.[92] Consequently, we disagree with PSWN's statement that the proposed use of the 5.9 GHz band "is only tangentially related to public safety . . . services"[93] and is "geared toward the development of technology for traffic management issues."[94] While we appreciate and champion the needs of traditional public safety entities? in particular emergency responders such as police. fire departments. and medical personnel, the benefits of ITS service. such as preventing motor vehicle crashes. should not be diminished.% The prevention of injuries, fatalities, and property damage would benefit the public on both the societal and individual level. According to ITS America, many DSRC-based ITS applications promise to prevent these crashes from occurring.[97] Moreover, we note that Congress has also established improving the nation's ability to respond to emergencies and natural disasters as a goal of the national ITS program,[98] which should benefit traditional public safety entities. Finally, ITS America reports that the clear consensus of the ITS stakeholders is that "a significant portion of the DSRC spectrum be designated for ITS-related public safety services, and licensed as such."[99] Consequently. we tentatively conclude that the 5.9 GHz band should be used primarily for "public safety" purposes. We seek comment on this tentative conclusion.

19. ***Public safety radio services.*** In the July *Ex Parte* Comments. ITS America recommends that we define "public safety" for ITS purposes consistent with the definition of "public safety radio services" under Section 309(j)(2) of the Act.[100] Section 309(j)(2) exempts from the Commission's auction authority licenses and construction permits issued for 'public safety radio services." "Public safety radio services''

[91] According to the Federal Highway Administration, an agency of DOT. "motor vehicle crashes are the leading cause of death among Americans 1-34 years old at http://safety.fhwa.dot.gov/facts_data_data.htm.

[92] Bureau of Transportation Statistics, DOT, Table 2-17 Motor Vehicle Safety Data <NTSS99main/http://www.bts.gov/btsprod/nts/Ch2_web/W2-17NEW>.

[93] PSWN Reply Comments at 3.

[94] *Id.*

[95] ***See*** The 4.9 GHz Band Transferred from Federal Government Use, Wt Docket No. 00-32. ***Second Reporl and Order and Further Notice of Proposed Rulemaking***, FCC 02-47 (2002).

[96] We note that Commission precedent has a tradition of treating specific kinds of communications services related to transportation as public safely. The Highway Maintenance Radio Service, a part of the Public Safety Radio Services, was established in 1949 as an aid to other public safely services to keep main roads safe for vehicular uafiic. State and local governmental entities are licensed in this service to provide emergency and routine communications for highway departments and maintenance vehicles and crews engaged in snow-plowing. clearing debris, repairing road damage, and otherwise maintaining highways to keep them open for normal travel. Wireless Telecommunications Bureau, Federal Communications Commission, Staff White Paper. Private Land Mobile Radio Services: Background (1996).

[97] ***See*** ITS America, Delivering the Future of Transportation The National Intelligent Transportation Systems Program Plan: A Ten Year Vision (2002).in which ITS America predicts that ITS will reduce the number and severity of accidents, thus saving 5,000-7.000 lives a year by 2011.

[98] TEA-21 at § 5203(a)(5).

[99] Status Report at 18

[100] July ***Ex Porte*** Commmts at 10.

include 'private internal radio services used by State and local governments and non-government entities (NGOs) and including emergency road services provided by not-for-profit organizations, that—(i) are used to protect the safety of life, health. or property: and (ii) are not made commercially available to the public."[101] The public safety radio services exemption includes not only "traditional public safety services such as police, fire, and emergency medical services"[102] but also non-commercial: private internal radio services used by State or local governmental entities. "without any further showing as to eligibility."[103] Not-for-profit organizations that provide private internal, non-commercial radio service for emergency road services are specifically included.[104] Other non-commercial. privare internal radio services may be classified as public safety radio services if they (1) are used by entities whose infrastructure is used primarily for the purpose of providing essential public services to the public at large; and (2) need, as part of their regular mission, reliable and available communications in order to prevent or respond to a disaster or crisis affecting the public at large.[105] Non-commercial. private internal radio services used by "utilities, railroads, metropolitan transit systems. pipelines, private ambulances, and volunteer fire departments"[106] have been found to meet this two-part test. A private internal radio service is "a service in which the licensee does not make a profit, and all messages are transmitted between fixed operating positions located on premises controlled by the licensee and the associated fixed or mobile stations or other transmitting or receiving devices of the licensee."[107] One of the most common characteristics of private internal radio systems is that they are "not operated as a direct source of revenue, but rather as a means of internal communications to support the day-to-ilay needs of the licensees' business operations."[108] Service 'hot made commercially available to the public" means that the

[101] 17 U.S.C. § 309(j)(2).

[102] Implemmtation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies, Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz, WT Docket No. 99-87, *Report and Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 22709, 22710 ¶ 64 (*BBA Report and Order*). *See also,* Implemmtation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended, WT Docket No. 99-87, *Memorandum Opinion and Order,* 17 FCC Rcd 7553.7557 at ¶ 9 (2002) (*BBA MO&O*).

[103] *BBA Report and Order,* 15 FCC Rcd 22709, 22742-22743 ¶ 69. "We conclude that all state and local government entities are eligible for licensing in the public safety radio services without any further showing as to eligiblity, subject to the statutory requirements for spectrum to be deemed auction-exempt." *Id.*

[104] 17 U.S.C § 309(j)(2). *See BBA Report and Order.* 15 FCC Rcd 22709.22743 ¶ 71 in which the Commission discusses the legislative history of the Balanced Budget Act which indicates that this exemption applies to emergency road services provided by not-for-profit organizations. such as the American Automobile Association, but not to "internal road services used by automobile manufacturers and oil companies to support emergency road services provided by those parties as part of the competitive marketing of their products."

[105] *BBA Report and Order,* 15 FCC Rcd 22709.22747 ¶ 77.

[106] Though not specified in 17 U.S.C. § 309(j)(2). the Conference Report to the Palanced Budget Act of 1997. Pub. L. No. 105-33, Title III, 111 Stat. 251 (1997). identified these entities as public safety radio service eligibles. H.R Conf. Rep. No. 105-217, 105th Cong.. 1" Sess. at 572 (1997). *See also. BBA Reporr and Order,* 15 FCC Rcd 22709.22746 ¶ 75 (2000).

[107] *BBA Report and Order* at 22741-22742 ¶ 67. *See also BBA MO&O*, 17 FCC Rcd at 1566 ¶ 32

[108] Implemmtation of Sections 309(j) and 337 of the Communications Act of 1934 as amended. Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies. Establishment of Public Service Radio Pool in Private Mobile Frequencies Below 800 MHz. WT Docket No. 99-87. *Notice of Proposed Rulemaking*, 14 FCC Rcd 5206, 5226 ¶ 33 (1999) (*BBA NPRM*). *See also.* Amendment of the Commission's Rules Regarding Multiple Address Systems. WT Docket No. 97-81. *Memorandum Opinron and Order,* 16 FCC (continued...)

telecommunications "service is not provided with the intent of receiving compensation. and is not available to a substantial portion of the public."[109]

20. As described above, many DSRC-based ITS applications will be used to reduce the number of injuries and fatalities and the amount of property damage due to motor vehicle crashes. These purposes are consistent with Section 309(j)(2) of the Communications Act of 1934. Moreover. while many 'of these safety-related DSRC-based ITS applications will be used by State or local governmental entities, and NGOs authorized by governmental entities, it is also possible that a significant number of DSRC-based ITS applications will involve public safety operations by entities that are within the definition of public safety radio services, but either do not or should not. have to meet the criteria for NGO licensing under Section 337(f).[110] Such entities are utilities, pipelines, railroads, metropolitan transit systems, private ambulances, or volunteer fire departments. which were specifically mentioned by Congress as eligible for the exemption under Section 309(j)(2).[111] These factors, in conjunction with the purpose of the Intelligent Transportation System program -- to improve the safety and efficiency of the nation's surface transportation system through the use of advanced electronics and communications -- leads us to seek comment on whether we should define "public safety" for purposes of the ITS radio services consistent with the public safety radio services exemption in Section 309(j)(2) of the Act or in some other manner.

21. ***Section 337(f)(1).*** We also seek comment on using the definition of public safety contained in Section 337(f)(1)[112] of the Act. Section 337(f)(1) of the Act defines ''public safety services" as services:

> (A) the sole or principal purpose of which is to protect the safety of life, health, or property;
> (B) (i) by State or local government entities, or
> (ii) by nongovernmental organizations that are authorized by a governmental entity whose primary mission is the provision of such services; and
> (C) that are not made commercially available to the public by the provider."'

Such a standard would generally limit uses of the spectrum to state and local gcvernmental entities and non-governmental organizations authorized to provide public safety services by a governmental entity whose primary mission is to protect the safety of life. health. or property.[113]

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Rcd 12181, 12187-12188 ¶ 12 (2001) (*MAS MO&O*) in which the Commission concluded that a company's use of MAS frequencies constituted a private internal radio service. even though the remote units were installed at the end user's premises. The Commission further found that because the service, monitoring alarm systems. was an "end-product, rather than a telecommunications service," it was not a "'direct source of revenue'" but rather a "means of internal communications to support a business."

[109] *BBA Report and Order,* 15 FCC Rcd 22709.22750 ¶ 82. *See also BBA MO&O*, 17 FCC Rcd at 7566 ¶ 32 *citing MAS MO&O*, 16 FCC Rcd 12181, 12187-12188 ¶ 11.

[110] *See infra* para 21

[111] *See supra* n. 106

[112] 47 U.S.C. § 337(f)(1).

[113] *Id.*

[114] The Commission has previously concluded that all state or local government entities that provide of public safety services not made commercially available to the public fall within the definition of Section 337(f). *700 MHz First R&O*, 14 FCC Rcd at 180-81 ¶ 54; *see also* 47 C.F.R. § 90.523(a).

2. Non-public safety **uses**

22. In addition to public safety, ITS America recommends that private radio licensees providing DSRC-based **ITS** services be permitted in the band. ITS America believes that permitting private radio licensees in the 5.9 GHz band is necessary to achieve national interoperability of DSRC services:"' in essence **ITS** America **maintains** that permitting private **radio** licensees would create an incentive for vendors to quickly and economically develop the technology necessary for the numerous DSRC applications contemplated for **this band**.[116] Incentives are needed because "making DSRC available in the 5.9 GHz band will require **a** very large technology investment by prospective vendors'' who are "reluctant to make **such** an investment unless there is a clear market for the resulting products."'' Public safety entities would then benefit from the cost savings derived from economies of **scale**,[118] and "safety-related DSRC services should be accorded the highest priority in the licensing and service rules."'' In light of ITS America's consensus building activities and the favorable comments on this issue in response to the ***Public*** Notice. we seek comment on whether to allow "private." *i.e.*, "non-public safety" DSRC operations in some portion of the 5.9 GHz band.

23. For commenters who believe that we should permit non-public safety uses of the 5.9 GHz band, we seek comment on ITS America's recommendation to amend **Part** 90 of the Commission`s Rules to define 'private services," *i.e.*, "non-public safety use of the DSRC band." **as:**

> A radio service used for **data** transmission between a licensee's fixed Roadside Unit located on premises controlled by the licensee and associated mobile On-Board Units of the licensee or non-associated mobile On-Board Units licensed by rule pursuant to **this** subpart, and is **not** offered **as** a telecommunications service or otherwise operated **as** a direct source of revenue, but is used to support the licensee's business operations or to protect the safety of their employees, customers, or the general **public**.[120]

We seek comment **on** whether we should permit non-public safety DSRC operations in the 5.9 GHz band; and, if so, whether we **should** adopt ITS America's recommended definition of 'private services," *i.e.*, "non-public safety services." We note that ITS America based its definition on **47** C.F.R. § 101.1305, which is the definition of "private internal services" that governs Multiple Address Systems (MAS)."' In this connection. we invite comment on whether to use that definition, which is **as** follows: "[a] private internal service is a service where entities utilize frequencies purely for internal business purposes or public safety communications and not on a for-hire or for-profit basis."'' Alternatively. we seek comment on the feasibility of framing

[115] **Status** Report at 22.

[116] **See** id. at 9-10 **and** 19

[117] *Id.* at 9

[118] Id. at iii.

[119] *Id.* at 18

[120] July *Ex Parte* Comments at 47.

[121] *See, e.g., id.* at 46 n.87 *citing* 47 C.F.R. § 1305.

[122] 47 C.F.R. § 1305.

the definition of non-public *safety* use without reference to the definition of "private internal radio services." For example, should we instead enumerate specific DSRC-ITS applications that would qualify for non-public safety use? Or, could non-public safety use be defined as follows: "use of the 5.9 GHz band for DSRC, see 47 C.F.R. §§ 90.7, 90.371. that does not qualify as public safety use of the 5.9 GHz band?

C. Interoperability

24. Background. Communications will form the backbone of DSRC-based ITS applications.[123] Interoperable DSRC-based ITS applications, in turn, will promote interstate commerce and enhance the safety and efficiency of the nation's surface transportation system. As noted above, several ITS applications are currently deployed in the 902-928 MHz band and have been successful.[124] ITS America reports that electronic toll collections have increased the capacity of toll collection systems by 250 percent with the resulting efficiency gains reducing emissions caused by idling motors by up to 83 percent.[125] Electronic clearance for commercial vehicles has been deployed along several trucking corridors, thus enabling regulatory authorities to quickly and accurately check credentials, size. weight. cargo, and selected *safety* information.[126]

25. Although ITS America reports the successful implementation of DSRC operations in the 902-928 MHz band, it states that "the ITS community is confronting problems caused by non-interoperable systems and devices. . . ."[127] For example, ITS America explains, "[t]oll agencies . . . have required . . . vendors to create proprietary s stems for individual toll systems;"'' thus, even within a State, toll systems are often incompatible.'' ITS America continues, "the lack of a common transmission standard for electronic toll collection systems, such as Fastrak®, Tolltag®, Sunpass®, and EZ-Pass®, means that the tag for one toll system may cause interference to another toll system." "Interstate vehicles, especially commercial vehicles are forced to carry multiple toll tags for commonly traveled routes or stop to pay at those toll booths for which it does not have a proprietary tag."'' ITS America concludes "[s]olving these and similar problems is not possible at the local or statewide level. National attention and resources must be applied."[132] DOT also sought to address the lack of interoperable systems when it initiated a rulemaking to require the use of the "FHWA Specification for 'Dedicated Short Range

[123] ITS *America* Allocation Petition at 13

[124] See supra para. 6

[125] ITS America Allocation Petition at 13, *citing* U.S. Department of Transportation, "Intelligent Transportation Infrastructure Benefits: Expected and Experienced," Operation Time Saver Press Kit (January 1996).

[126] ITS *America* Allocation Petition at 15

[127] July *Ex* Parte Comments at 30.

[128] Id.

[129] See *id.* at n.55, where ITS *America* states that "[o]nly California has attempted to require vendors to build toll equipment to a common standard."

[130] Id. at 30.

[131] Id.

[132] Id.

Commercial Communications (DSRC) for Commercial Vehicles"' as a provisional standard for ITS commercial vehicle projects using highway trust funds.[133] Not only does a lack of interoperability negatively effect interstate commerce, it may become a disincentive to deploying several DSRC-based ITS applications especially those that are safety related such as vehicle-&vehicle communications. where it is critical that vehicles be able to communicate with each other regardless of their location.

26. DOT. Congress also recognized the need for national interoperable DSRC-based ITS applications. In enacting TEA-21 in 1998, Congress made several changes to the national ITS program that it had created in 1991, in ISTEA, and mandated that DOT and the Commission accomplish several tasks related to the development of national, interoperable DSRC operations. First. TEA-21 directed the Secretary of DOT, through the National Architecture, to promote "interoperability[134] among . . . intelligent transportation systems technologies implemented throughout the United States."[135] Second, TEA-21 required DOT and ITS America to develop a National ITS Program Plan. in which DOT and ITS America were to "identify activities that provide for the dynamic development of standards and protocols to promote and ensure interoperability in the implementation of intelligent transportation system technologies. . . ."[136] Third, TEA-21 authorized DOT to "use the services of such standards development organizations as the Secretary determines to be appropriate."[137] Fourth. TEA-21 required DOT to report to Congress, by June 1, 1999, "which standards are critical to ensuring national interoperability."[138] In June 1999, DOT identified the standard for DSRC operations in the 5.9 GHz band as a critical standard."'

27. *The Commission.* In response to TEA-21's direction to the Commission to consider the spectrum needs for DSRC-based ITS systems,'" the Commission released the ***Allocation NPRM*** which sought comment on "other technical issues in order to encourage industry to begin a process that. we believe, will lead to consensus on standards that will permit nationwide interoperability for some DSRC applications and that bear fruit in a future proceeding to establish licensing and service rules."[141] In the ***Allocation Report and Order,*** however, the Commission noted that the standards were still under

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[133] See Dedicated Short Range Communications in Intelligent Transportation Systems (ITS) Commercial Vehicle Operations, FHWA Docket No. FHWA-99-584464, ***Notice of Proposed Rulemaking***, Fed. Reg. 73671 (Dec. 30,1999). Subsequently, FHWA reopened the comment period on Docket FHWA-99-5844 and delayed issuance of a final rule. ***See*** Dedicated *Short* Range Communications in Intelligent Transportation Systems (ITS) Commercial Vehicle *Operations*, FHWA Docket No. FHWA-99-584464, ***Supplemental Notice of Proposed Rulemaking***, 65 Fed. Reg 77531 (Dec. 12. 2000).

[134] ISTEA required the ***Secretary*** of DOT to promote compatibility among ITS systems. See *supra* n. 11

[135] TEA-21 at 5206(a)(2).

[136] TEA-21 at § 5205(a)(2)(C).

[131] ***Id.*** at § 5206(a)(3).

[138] ***Id***. at § 5206(b).

[139] U.S. Department of Transportation. ***Intelligent Transportation Systems: Critical Standards*** at 19 (June 1999).

[140] ***See supra*** n. 31

[141] Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services. ET Docket No. 98-95. ***Notice of Proposed Rulemaking***, 13 FCC Rcd 11321. 14335 ¶ 28. (1998) (*Allocation NPRM*).

development by DOT and once "such standards are developed, the Commission will take whatever action is necessary to implement the standards related to DSRC use.'""

28. ITS *America and the Standards Writing Group.* Subsequent to the Commission's allocation of the 5.9 GHz band to the mobile service for use by DSRC systems, ITS America began to hold stakeholder workshops, panel discussions, and other industry meetings to develop a consensus on how to achieve national interoperability in the deployment of DSRC-based ITS user services."' The Federal Highway Administration (FHWA), an agency of DOT entered into a cooperative agreement[144] with the American Society for Testing and Materials (ASTM)[145] to develop a national, interoperable standard for DSRC equipment operating in the 5.9 GHz band. ASTM, through its Working Group E17.51 (Standards Writing Group), which operates as a consensus-based organization in accordance with the operating principles of the American National Standards Institute (ANSI),[146] began to develop new user requirements for DSRC at 5.9 GHz and to draft open and interoperable standards.[147] Public safety agencies and others provided input to the Standards Writing Group.[148] Amtech industries (now part of TransCore Corporation), Mark IV Industries, Raytheon, and Sirit Technologies, the primary DSRC manufacturers of North America, formed the DSRC Industry Consortium and provided input to the Standards Writing Group.[149] DOT funded Aeronautical Radio. Inc. (ARINC) and John Hopkins University's Applied Physics Laboratory (JHU APL) to objectively analyze and evaluate competing technologies and standards for DOT and ITS America.[150]

29. *The ASTM-DSRC Standard.* On August 24,2001, the Standards Writing Group selected. by a vote of 20-2, a version of the Institute of Electrical and Electronic Engineers. Inc.'s (IEEE) 802.11 and 802.11a standard,[151] which uses Orthogonal Frequency Division Multiplexing (OFDM),[152] as the

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[142] *Allocation Report and Order,* 14 FCC Rcd at 18221 ¶ 1

[143] Status Report at ii.

[144] See Transportation Equity Act for the 21" Century; Critical Intelligent Transportation Standards, *Notice, 66* Fed. Reg. 20517 *(Apr.* 23,2001). where the Federal Highway Administration (FHWA) states that in response to the requirements of TEA-21. it entered into cooperative agreements with five Standards Development Organizations (SDOs), including ASTM, to accelerate the development of ITS standards that would promote national interoperahility. FHWA further states that the standards developed under this program are "consensus standards and will remain the property of the SDO under which they were developed." *See also* Status Report at 11-12.

[145] According to ITS America, ASTM is a participating member of the *American* National Standards Institute (ANSI). *See* July *Ex Parfe* Comments at 13.

[146] ITS America reports that the proceedings of the Standards Writing Group are *open.* inclusive. and characterized by due process and that decisions are reached through consensus, cooperation, and compromise. July *Ex Parfe* Comments at 13.

[147] Status Report at 11-12

[148] *Id.* at 12.

[149] *Id.* at 15-16.

[150] *Id.* at 11-15

[151] ITS America maintains that using a variant of IEEE 802.11 and 802.11a "should provide the higher data rate capabilities and reliability needed for DSRC operations." Moreover. ITS *America* maintains that a large (continued....)

preferred technology to provide national interoperability for DSRC operations.[153] The choice of OFDM'" technology permits the use of a wide range of bandwidths. from tens of kHz to tens of MHz, thus giving licensees the flexibility to use the particular digital emissions and bandwidths that meet their operational needs.[155] Such flexibility would foster interoperability of equipment made by different manufacturers. On August 30. 2001, the OFDM Forum, an association organized to promote a single worldwide OFDM standard for high-speed wireless communications, endorsed the Standards Writing Group's selection of a variant of IEEE 802.11 and 802.11a. for roadside applications.'" ITS America reported that the modification of IEEE 802.11 and 802.11a for ITS roadside applications was completed and successfully balloted by the ASTM Subcommittee E17.51 Vehicle Roadside Communication on May 10, 2002 and entitled "ASTM E2213-02, Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems – 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY)" (ASTM-DSRC Standard).[157]

30. ITS America recommends that the Commission specify that all DSRC operations in the 5.9 GHz band comply with the ASTM-DSRC Standard."' Specifically. ITS America recommends the adoption of layer 1, the Physical Layer and layer 2, the Medium Access Control Layer.[159] The Physical Layer. refers to the hardware specifications and modulations requirements and the Medium Access Control layer includes instructions detailing how the Physical Layer accesses the 5.9 GHz band frequencies.'" ITS America reports that the ASTM-DSRC Standard is an open, non-proprietary wireless

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manufacturing base exists for IEEE 802.11 and 802.11a, which could be used to manufacture DSRC equipment. July *Ex Parte* Comments at ii.

[152] See Intelligent Transportation Society of America, *OFDM Technology Selected for Road Safety and Traffic Management Applications Standard* (Aug. 30, 2001) at http://www.itsa.org/ITSNEWS.NSF. See July *Ex Parte* Comments at 13.

[153] Intelligent Transportation Society of America. *IEEE 802.11a Selected For DSRC* (Aug. 27.2001) at http://www.itsa.org/ITSNEWS.NSF.

[154] *OFDM* is a *digital* emission consisting of multiple carriers within a single authorized bandwidth or channel, each of which is modulated with a portion of the information being transmitted in the bandwidth or channel. The signal modulating each carrier is itself a digital emission. such as QAM (Quadrature amplitude modulation). The amplitudes and spacing of the carriers are such that the spectral energy of each carrier is significantly anenuated at the frequencies of each of the two adjacent carriers. See *e.g.*, Request for Declaratory Ruling Removing the Commission's *Minimum Carrier* Tone Requirement for OFDM Modulation in the Multipoint Distribution and Instructional Television Fixed Services, MM Docket No. 01-145, *Declaratory Ruling and Order,* 16 FCC Rcd 17067 at n. 2 (2001).

[155] *Id.* at 17069 at ¶ 6.

[156] See *supra* n. 152

[157] July *Ex Parte* Comments at 1-2, 13. ITS Amaica states that the official publication by ASTM is expected in late summer 2002.

[158] *Id.* at 1.

[159] *Id.* at ii and iii

[160] *Id.* ITS Amaica reports that there are additional layers under development that do not implicate radio frequency issues.

standard and that a licensing fee will not be charged for its use. although ASTM holds the copyright to the ASTM-DSRC Standard.[161] Consequently. ITS America recommends that the Commission incorporate the ASTM-DSRC Standard by reference into Part 90. Subpart M. of the Commission's Rules.[162] ITS America further recommends that we amend Part 90 of the Commission's Rules and "invoke the certification procedures . . . found in subpart J of Part 2 of the Commission's Rules"[163] to require DSRC equipment manufacturers to comply with the ASTM-DSRC Standard[164]

31. Discussion. As noted above, the statutory framework of the ITS program demonstrates that Congress believes that intelligent transportation technologies should be interoperable and TEA-21 appears to contemplate the adoption of a "wireless"[165] standard as a means towards achieving interoperability.[166] Neither ISTEA nor TEA-21 defines interoperability within the context of the ITS program. In this connection, we note ITS America's comment that both public safety and non-public safety radio must use the same standard to achieve economies of scale. and their recommendation that we specify that all DSRC operations and equipment using the band conform to the ASTM-DSRC Standard. We seek comment on whether all applications in the band must be interoperable or whether only the public safety applications must be interoperable. Because our current definition of "interoperability"[167] does not contemplate public safety and non-public safety radio licensees sharing an interoperable standard, we seek comment on whether we should revise it to exclude DSRC. Alternatively. should we adopt a separate definition of "interoperability" for DSRC operations? For example, the current Part 90 definition of interoperability concerns only the communications link: we seek comment on whether any definition of interoperability in the context of DSRC. should include equipment compatibility, such that OBUs and RSUs coming from different vendors should be interchangeable[168] Thus. an OBU or RSU manufactured by vendor X would be able to communicate and exchange information with an OBU or RSU manufactured by vendor Y.

32. While ITS America has developed a consensus on the adoption ofthr ASTM-DSRC Standard as the means of achieving interoperability, as a general rule, the Commission does not select a single standard for equipment,[169] leaving the selection of technology to its licensee;. ITS America notes, however, that the Commission has, in the past, adopted standards when there is a substantial public

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[161] Id. at 29. 35. andn. 33. See *also* n. 144 *supra*

[162] Id. at 37

[163] Id. at 38.

[164] Id. 37-38

[165] *See supra* n. 31

[166] TEA-21 states that "the *Secretary* shall develop . . . a national architecture and supporting standards" and "[i]n carrying out this section. the Secretary may use the services of such standards development organizations the *Secretary* determines to be appropriate." TEA-21 at § 5206(a)(1) and (3).

[167] Section 90.7 of the Commission's Rules defines interoperability as "An essential communication link within public safety and public service wireless communications systems which permits units from two or more different entities to interact with one another and to exchange information according to a prescribed method in order to achieve predictable results." 47 C.F.R. § 90.7.

[168] See para. 40 *infra* for a detailed discussion of OBUs and RSUs

[169] *See, e.g., 700 MHz First R&O*, 14 FCC Rcdat 207-211 ¶¶ 118, 121, 123. 124, 130. 132

benefit and when private industry is unwilling or unable to reach agreement on a single industry **standard**.[170] Moreover, **ITS** America *states* that "**[w]here** products and services, whether for communications or otherwise, are introduced to the public based on competing standards, it has taken years or even decades to gain market acceptance."'" **ITS** America further maintains that requiring DSRC equipment **to** be type-certified would create an incentive for equipment manufacturers to develop equipment specifications based on the ASTM-DSRC Standard because they would have access to the largest possible **market**.[172] **ITS** America further argues that the adoption of a particular standard would **assure** customers that an investment in a particular technology would not be "rendered obsolete by a subsequent, different technology."[173] **ITS** America further maintains that the "lack of standards may cause consumers and manufacturers to adopt a 'wait and see' approach before purchasing or making devices, respectively slowing down **deployment**."[174]

33. In light of the efforts of **ITS** America, ASTM, and DOT to reach a consensus on the adoption of the ASTM-DSRC Standard for the development and deployment of DSRC operations, we seek comment on whether the industry **as** a whole **has** reached an agreement on the adoption of the ASTM-DSRC Standard. thus rendering our incorporation of a particular standard into the Commission's Rules unnecessary. We seek comment on whether we should adopt a standard applicable to public safety and non-public safety **radio** DSRC operations or whether we should adopt a standard only for public **safety** DSRC operations. We seek comment on whether the marketplace can achieve the interoperability necessary for DSRC-based ITS systems. If the marketplace **cannot** achieve interoperability, are there other ways of achieving intemperability without compromising competitive neutrality? We seek comment on whether we should require DSRC devices to be type-certified under the Commission Rules. We further seek comment on whether the complex technology involved in DSRC operations, which may change rapidly, would render a particular standard obsolete or whether the adoption of a particular standard would spur development of the DSRC **radio** service.

34. If commenters believe that the adoption of a standard is necessary, we ask these commenters whether the ASTM-DSRC Standard is the appropriate standard. For **standards** that consist of numerous layers and/or suites or menus, commenters should specify whether the Commission should adopt any specific layers, suites or items within menus within that standard relative to the communications link. We seek comment on **ITS** America's recommendation that we adopt Layers **1** and 2 of the ASTM-DSRC standard for all DSRC operations in the 5.9 GHz band. The full standard is **available** at www.ASTM.org. We further seek comment ***on*** whether we should adopt equipment performance requirements for this band. We note that it is vital that the performance requirements capture the ideal compromise between component size, power consumption, and radiated power needed to implement DSRC operations. We note that for the Commission to adopt a particular standard, we require that such a standard be approved in an open and fair process, and that it be approved by an ANSI-Accredited Standards Developer. We further require that the owner or holder of the rights to the standard agree, by filing a statement with ITS America or DOT, that they will ***make*** such rights available without cost or Without discrimination.[175] We

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[170] July *Ex* Parte **Comments** at **32.**

[171] ***id.*** at **29.**

[172] ***id.*** at **37-38.**

[173] *Id.* at 32.

[174] ***id.*** at **33.**

[115] For similar requirements placed ***on*** **the** National Coordination Committee, in developing **an** interoperable **standard** in the 700 MHz public safety band. see Development of Operational, Technical **and** (continued....)

note that, should we decide that the adoption of a particular standard is necessary. we will not unnecessarily disturb future recommendations by the ANSI-Accredited Standards Developer.

D. Band Plan

35. In the Allocation *NPRM*, the Commission recognized that "some channelization of the DSRC spectrum may be essential to promote spectrum efficiency and to facilitate interoperability."[176] In this regard, ITS America recommends that the Commission adopt a channel plan, described below. to further promote interoperability between DSRC-based ITS applications in this country.[177] ITS America further indicates that it has initiated talks with Canada and Mexico to achieve agreement on channel plans at the borders.[178] See the diagram below for a brief overview of the ASTM-DSRC Standard channelization plan.

5.850 GHz							5.925 GHz
		CH175			CH181		
reserve	CH172	CH174	CH176	CH178	CH180	CH182	CH184
	service (vehicle-to vehicle)	service	service	control	service	service	service (high power)
5 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz

36. Accordingly, we seek comment on the ITS America's recommended channelization plan,[179] contained in the ASTM-DSRC Standard which is an adaptation for DSRC of the IEEE 802.11a standard. ITS America concluded that the use of ASTM-DSRC Standard would promote interoperability, and would allow data exchange rates of up to 27 Mbps or up to 54 Mbps, depending on whether ten-megahertz-wide or twenty-megahertz-wide channels are used.[180] These data rates and channel bandwidths are the consequence of choosing Orthogonal Frequency Division Multiplexing as the modulation scheme. ITS America's channel plan, as depicted above, divides the seventy-five megahertz of spectrum into eight channels: one five-megahertz channel and seven[181] ten-megahertz channels, which include one

(Continued from previous page)

Spectrum Requirements for Meeting Federal. Slate and Local Public Safety Agency Communication Requirements through the Year 2010, WT Docket No. 96-86. *Memorandum Opinion ond Order on Reconsiderofion.* 14 FCC Rcd 8059 (1999). We note that ASTM holds the copyright to the ASTM-DSRC Standard. See July Er *Parte* Commentsatn. *33*.

[176] *Allocation NPRM*, 13 FCC Rcd 14321, 14340 ¶ 38.

[177] *See* First and Second Proposed Band Plans. See *also* July *Ex Parte* Comments at 58-64.

[178] See Second Proposed Band Plan at 5. 10. and 16

[179] *See* Second Proposed Band Plan. See *also* July *Ex Parte* Comments at 58-64 and Appendix D.

[180] July *Ex Parte* Comments at *58-62.*

[181] ITS America reports that to complete a successful transmission in highly reflective urban multi-path locations. the Standards Writing Croup modified JEEE 802.11a by reducing the clock frequency. data rates. and channel bandwidths by a factor of two to provide more robust and reliable communications. According to ITS America this calculation results in channel bandwidths of 10 megahertz with possible data rates from six Mbit/s to 27 Mbit/s. July Ex Parte Comments at 58-59.

Control Channel and six Service Channels. The five-megahertz channel is reserved for harmonization with potential extension of the Unlicensed National Information Infrastructure (UNII) band. Two service channels[182] are dedicated; Channel 172 for public safety and private vehicle-to-vehicle communications, and Channel 184 for public safety "high power, long-range" communications of up to 1000 meters and private uses when authorized by a frequency coordinator.[183] Private applications, however, must not interfere with, and must accept interference from. existing Public Safety applications when transmitting on Channel 184.[184] Four ten-megahertz Service Channels, Channels 174/176 and Channels 180/182 can be combined to provide up to two, twenty-megahertz Service Channels, Channels 175 and 181, respectively, thus increasing the possible maximum data rate to 54 Mbps.[185]

37. Channel 178 is dedicated for Control Channel functions.[186] ITS America reports that the ASTM-DSRC Standard does not yet include a laver addressing how the Control Channel will be accessed.[187] According to ITS America, however, to maximize the efficiency and quality of service in the 5.9 GHz band while minimizing interference between services, the Control Channel should be used for communications shorter than 200 microseconds.[188] in intervals of no less than two seconds. Possible protocol for the Control Channel access could include the requirement that all OBUs automatically select and monitor the Control Channel, and wait for announcements, data transfers, or warning messages from RSUs.[189] Public safety and private radio licensees would share use of the Control Channel to ensure that public safety warning announcements are received by all OBUs within the particular public safety communications zone.[190] Private messages shorter than 200 microseconds could be transmitted on the Control Channel,[191] although public safety messages would always receive higher priority for use of the Control Channel.[192]

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[182] ITS America reports that the ASTM-DSRC Standard derives its numbering scheme from the IEEE 802.11a variant and the UNII band at 5735-5815 MHz to prevent channel selection discrepancies in dual mode devices. July *Ex* Parre Comments at 59.

[183] Second Proposed Band Plan at 9, 16. July Ex *Parte* Comments at 60 and 62.

[184] Second Proposed Band Plan at 15.

[185] Second Proposed Band Plan at 16. July Ex *Parte* Comments at 62. See also Section III.B hereof for discussion of eligibility. ITS America reports that using an OFDM modulation system, the control channel and service channels *can* support data transmission rates of 3. 4.5. 6. 9. 12. 18. 24, and 27 Mbit/s. Optional twenty-megahertz channels *can* achieve transmission rates of 6. 9 12. 18. 24. 36.48, and 54 Mbit's. July Ex *Parte* Comments at 59.

[186] July Ex *Parte* comments at 60.

[187] Id. at 60-61, and Appendix C at 12. ITS America reports that protocols fur using the Control Channel are expected to be finalized and available for Commission consideration as part of any future rulemaking proceeding. ITS America *states* that the ASTM-DSRC Standard is 'prepared with the assumption that there will be additional higher layer aspects to the standard, including Control Channel access." Id at 60.

[188] Id. at 60

[189] Second Proposed Band Plan at 10. July Ex *Parte* Comments at 60

[190] July Ex Parre Comments at 61 and 63.

[191] Id. at 61.

[192] Second Proposed Band Plan at 8. July Ex *Parte* Comments at 61

38. We also seek comment on alternatives to the ITS America band plan. For example. would it be better to establish a different channel band-width. such as five-megahertz per channel? In addition. we solicit comment on whether the band should be shared by all eligibles or whether it would be more appropriate to allocate the band by service. For example, we could divide the spectrum up by radio service instead of by function. Commenters supporting this approach should specify the different groups and how much spectrum should be allocated to each group. Because it appears that a very low power transmitter will be needed in vehicles (cars. trucks, vans. *etc.*) participating in ITS, another possible option would be to divide the *spectrum* based on licensed and unlicensed (Part 15) services. We further request comment on whether we should reserve spectrum. As mentioned above, ITS America proposes that we reserve five-megahertz of spectrum. In light of the fact that the number and type of DSRC-based ITS applications continue to evolve, is five-megahertz sufficient? Should we reserve more? in the 700 MHz proceeding, we reserved thirty-seven percent of the spectrum.[193] We seek comment on whether we should reserve a ten-megahertz segment from both channels 175 and 181

39. As noted, seventy-five megahertz of contiguous spectrum in the 5.9 GHz band has been allocated for DSRC operations. In the event that we select a licensing plan that results in the possibility of mutually exclusive applications for initial licenses. we seek comment on the appropriate amount of spectrum to be provided to each licensee. We seek comment on whether the spectrum should be licensed as one block, or broken down into two or more bandwidths. and whether there should be a mixture of spectrum blocks, depending on the service areas used for licensing. Commenters should note that this issue is directly linked to the outcome of the interoperability issue because it appears that the interoperability standard may channelize the band. The merits of sharing a particular channel, versus having exclusive use of it should be considered in light of some of the suggested non-public safety applications, such as Vehicle Diagnostic Data Transfer, or Locomotive Data Transfer. Regarding the RSUs, the merits of using the lowest possible transmit power for a particular application, which would improve the possibility of more licensees in a given area, should also be considered.

E. Licensing Plan

40. Background. We seek comment on the appropriate licensing plan for ITS. In order to discuss the licensing plan, some background concerning how DSRC-based ITS applications will communicate, according to ITS America. is necessary. As noted above, RSUs and OBUs will communicate using short-range, low-power data transmissions of limited duration.[194] Specifically, an RSU broadcasts data to or exchanges data with an OBU in its "communication zone" and provides channel assignments and operating instructions to it.[195] OBUs receive, contend for time to transmit, or are assigned a time to transmit on one or more radio frequency channels.[196] Except where specifically excluded, OBU operation is permitted wherever vehicle operation or human passage is permitted.[197]

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[193] See The Development of Operational. Technical and Spectrum Requirements For Meeting Federal. State and Local Public Safety Agency Communication Requirements Through the Year 2010 Establishment of Rule Requirements for Priority Access Service. WT Docket No. 96-98. *First Report and Order and Third Notice of Proposed Rulemaking*, 14 FCC Rcd 152. 157 ¶ 8.

[194] *See supra* para. 13 for additional background on DSRC devices.

[195] Semnd Proposed Band Plan at 11

[196] *Id.* at 13.

[197] *Id.*

OBUs may communicate with RSUs or other OBUs.[198] Except for designated applications. it is expected that all OBUs will automatically select the Control Channel and wait for application announcements. data transfers, or warning messages.[199] An application announcement will identify a DSRC service channel to be used for data transfer larger than those which can be handled by the Control Channel." For public safety applications at intersections. such as "emergency vehicle signal pre-emption" and "transit vehicle signal priority," a second OBU for intersection applications will be mounted in the public safety vehicle.[201] The intersection application OBU does not use the Control Channel.[202] For vehicle-to-vehicle applications, communications will be limited to only public safety related messages. such as vehicle location, status, and acceleration. The vehicle-to-vehicle OBU will be a second OBU in the vehicle and it does not use the Control Channel.[203] RSUs and OBUs must "listen" before transmitting.[204]

1. Road Side Units

41. Discussion. ITS America recommends that we propose to license the fixed RSU'O' on a shared, site-specific basis. Under site-specific licensing, a licensee is authorized to operate a station only at a specific location, using a specific frequency or frequencies. Generally. licenses are awarded on a first-come, first served basis, and/or after frequency coordination. which is the process by which a private organization, in most instances a FCC-certified frequency coordinator, recommends to the Commission the most appropriate frequencies for a station.[206] The application, filed through the Universal Licensing System,[207] proposes a transmission frequency, geographical coordinates. and other technical information concerning the proposed station, including its potential for electromagnetic interference with adjacent stations.

42. ITS America proposes that each licensed RSU would also correspond to, or be associated with, a specific "communications zone," within which all transmissions associated with it would be required to take place.[208] Under ITS America's recommendation, the licensed communications zone for

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[198] *Id.*

[199] *Id. See also* July Ex *Porte* Comments at 61

[200] Second Proposed Band Plan at 13

[201] First Proposed Band Plan at 7.

[202] *Id.* at 7.

[203] *Id.* at 8.

[204] Second Proposed Band Plan at 14.

[205] ITS America recommends that the fixed RSU be licensed on a site specific basis. but it does not describe how the portable/mobile RSU should be licensed. July Ex *Parte* Comments at 48.

[206] *See* 47 C.F.R. § 90.175

[207] Biennial Regulatory Review – Amendment of Pans 0, 1.2. 13. 22. 24. 26. 27. 80. 87. 90. 95. 97. and 101 of the Commission's Rules to Facilitate the Development and Use of the Universal Licensing System in the Wireless Telecommunications Services. WT Docket No. 98-20, Amendment of the Amateur *Service* Rules to Authorize Visiting Foreign *Amateur* Operators to Operate Stations in the United States, WT Docket No. 96-188, *Report and Order.* 13 FCC Rcd 21021 (1998) (*ULS Report and Order).*

[208] July Ex *Parte* Comments at 49.

public safety and non-public safety radio licensees would be permitted to overlap; public safety warning messages would be given priority rights for transmission across shared channels and overlapping communication zones, as well as generally in the band.[209] Directional antennas would be recommended to guard against harmful interference to adjacent communication zones and public safety communication zones that may overlap.[210] A communications zone for a particular RSU would be based on "the type of entity seeking a license, the type of proposed DSRC application. the requisite range for that application, the class of DSRC device, the transmitter power needed for that range for that application,"[211] how and where the RSU is to be installed, the type of antenna (directional or omnidirectional), the angle of antenna relative to the horizon or horizontal adjacent physical structures, and the topography."[212] For example, an emergency vehicle preemptive traffic light application would use a license that allows a 44.8 dBm maximum EIRP, and a directional antenna. A vehicle-to-vehicle application on the other hand might permit the use of an omnidirectional antenna and maximum 10 dBm EIRP.

43. The ASTM-DSRC Standard contains the following four DSRC device classes to be used for equipment-type certification for RSUs and OBUs, based on maximum device output power:[213]

Device Class	Maximum Device Output Power
A	0 dBm
B	10 dBm
C	20 dBm
D	28.8 dBm

Next the ASTM-DSRC Standard Limits operating fixed and portable RSUs in accordance with one of four installation classes, which would limit the maximum range of transmission (measured in meters) and the maximum transmitted power (measured in effective isotropic radiated power (EIRP)) that can be radiated in a particular direction.[214] The four installation classes are:

class	Maximum EIRP	Maximum Transmission Range
class 1	10 dBm EIRP	Up to 15 meters
class 2	20 dBm EIRP	Up to 100 meters
Class 3	33 dBm EIRP	Up to 400 meters
Class 4	44 8 dBm EIRP	Up to 1000 meters

According to ITS America, these equipment and license "class designations arc intended to simplify the application process and create a consistent licensing scheme for prospective licensees and frequency coordinators."[215] By using these two types of class designations, and setting both output power and EIRP

[209] Id.

[210] Id. at 53.

[211] *Id.*

[212] Id., Appendix C at 8.

[213] Id. at 49.

[214] Id. at 50.

[215] *Id.* at 50-51.

values, the possibility of increasing the numbers of users per given area increases. since more direct control over range of transmission is exerted. For administrative ease. ITS America recommends that applicants may seek authority to use up to six RSUs per license with the latitude and longitude and class designations identified for each.[216]

44. According to ITS America, this scheme would work as follows. An RSU at a toll plaza would, in most instances, require a communications zone covering a single lane of traffic. In this instance, an installation Class 1 or Class 2 designation using Class A or B devices would be appropriate.[217] An RSU at a major highway intersection that transmits messages or traffic conditions would use an installation Class 3 or Class 4 designation and a Class C or D device.'"

45. ITS America further recommends that FCC-certified frequency coordinators for existing public safety and private radio bands be authorized to coordinate applications for licenses in the DSRC radio service in the 5.9 GHz band; FCC-certified coordinators for the Public Safety pool would coordinate applications for public safety DSRC operations, and FCC-certified coordinators for the Industrial/Business pool would coordinate applications for private radio DSRC operations.[219] The frequency coordinator would verify that an applicant would not implement an unnecessarily large communications zone or produce an excessive interference contour in relation to the proposed DSRC-based ITS application.[220] Frequency coordinators would also attempt to minimize potential interference by assigning different Service Channels to licensees in overlapping or adjacent communications zones and/or requiring the use of directional antennas.[221] Frequency coordinators would review and specify the maximum authorized transmitter output power and range, and the RSU's class designation and would specify the Service Channels on which the licensee would be authorized to operate.[222]

46. We see, however, several potential disadvantages to site-specific licensing. We note that site specific licensing may be very cumbersome for radio systems comprised of several hundred sites. We further note that site-based licensing deprives licensees of the flexibility to relocate transmitter sites within a defined service area without obtaining the Commission's prior approval. Moreover, Section 8 of the Act[223] requires an application fee for each application, and Section 9 of the Act[224] requires a regulatory fee for each license, although in some instances governmental entities and non-profit organizations are exempt from fees.[225] Applicants would also have to pay for the services of a frequency

[216] Id. at 52-53.

[217] Id. at 51.

[218] Id.

[219] Id. at 64.

[220] Id. at 65.

[221] *Id.*

[222] *Id.*

[223] 47 U.S.C.§ 158.

[224] 47 U.S.C.§ 159.

[225] See U.S.C. §§ 158(d)(1) and 159(h)

coordinator every time they wanted to activate a new RSU or relocate an existing RSU. We note that all licensees would be required to be licensed for the control channel in addition to specific service channels.

47. In contrast, there are several potential advantages to geographic area licensing for RSUs. Under geographic area licensing, the licensee is authorized to operate within its geographic service area. Such licensees may operate without filing an application for individual stations within their service areas: thus, a licensee may modify, move, or add to its facilities within specified geographic areas without need for prior Commission approval.[226] This not only increases a licensee's flexibility to manage its spectrum, it also reduces administrative burdens and operating costs.[227] Geographic area licensing also facilitates interoperability and operational standards while allowing economies of scale that encourage the development of low cost equipment.[228] Moreover, the Commission has found that geographic area licensing offers distinct advantages for both public safety and commercial services.[229] With regard to the RSUs used for private radio DSRC-based ITS applications, we have stated that we will determine on a service-by-service basis, whether to adopt a geographic licensing scheme or retain eligibility and use rules.[230] Accordingly. we seek comment on licensing RSUs by geographic areas or by site-by-site licensing. We also invite commenters to propose other methods for licensing RSUs. For instance. we seek comment on whether we should license RSUs by rule.[231]

48. To the extent we adopt geographic area licensing, we seek comment on the appropriate geographic area to be used. When establishing geographic service areas, we must balance the competing need to provide large enough service areas and the need to choose geographic licensing areas that will permit the dissemination of licenses among a wide variety of applicants.[232] We also wish to ensure service to rural areas[233] and to promote investment in and rapid deployment of new technologies and services.[234] The Commission licenses spectrum using a wide variety of geographic areas. The 800 MHz cellular radiotelephone services are licensed using Metropolitan and Rural Service Areas (MSAs and RSAs).[235] The 24 GHz band is licensed by Economic Areas (EAs).[236] The 2.3 GHz band is licensed

[226] *ULS Report and Order, 13* FCC Rcd *21027.*

[227] Development of Operational, Technical and Spectrum Requirements for Meeting Federal. State and Local public Safety Agency Communication Requirements Through the Year *2010,* UT Docket No. *96-86. Third Memorandum Opinion and Order and Third Report and Order,* 15 FCC Rcd 19844, 19869 ¶ 54-55 *(2002).*

[228] *Id. at* ¶ 57.

[229] *Id.* at ¶¶ 54-55.

[230] BB4 *Report and Order.* 15 FCC Rcd 22709, 22725-22726 ¶ 32

[231] *See infra* para. 54 for a discussion of licensing by rule.

[232] *See 47* U.S.C. §§ 309(j)(3)(B), (4)(C)

[233] *See 47* U.S.C. § 309(j)(3)(A)

[234] *See 47* U.S.C. § 309(j)(4)(C)(iii)

[235] *See* Report No. CI-92-40, Common Carrier Public Mobile Services Information, Cellular MSA/RSA Markets and Counties, dated January 24, *1992.* DA 92-109, *Public Notice, 7* FCC Rcd 742 *(1992). See also 47* C.F.R.§ *22.909.* There are *731* MSAs and RSAs.

[236] *See* Amendments to Parts *1. 2.87.* and *101* of the Commission's Rules to License Fixed Services at 24 GHz, WT Docket No. 99-327, *Report and Order,* 15 FCC Rcd 16934, *16942-16944* (2000) *(24 GHz Report and Order).* There are *172* EAs, as defined by the U.S. Department of Commerce, and three additional Commission-

(continued...)

using the twelve Regional Economic Area Groupings (REAs) and the 52 Major Economic Areas (MEAs) which are derived from EAs.[237] The **746-764 MHz** and **776-794 MHz** bands are licensed by six Economic *Area* Groupings (EAGs), which are derived from EAs.[238] We seek comment on whether we should adopt a geographic area licensing scheme for public safety and non-public safety radio licensees. Commenters should address whether we should adopt separate geographic **area** licensing schemes for public safety and non-public safety radio licensees. For instance, it may be more advantageous to license the public safety licenses by a geopolitical area such **as** by State or metropolitan area Such a scheme, however, may not benefit non-public *safety* radio licensees; it may be more advantageous to license the non-public safety radio portion by **EA**[239] or by metropolitan statistical areas (MSAs) and rural service areas (RSAs), or nationally. Commenters should suggest the most appropriate **area** for public **safety** and noo-public safety radio licensees. Commenters should also address whether we should adopt one scheme for both public safety and non-public safety radio licensees and suggest the most appropriate scheme.

49. We also seek comment on the appropriate entities to hold public safety DSRC licenses. One possible licensing scheme would be to license all public safety DSRC operations in the 5.9 GHz band to a State-level agency responsible for administering the transportation infrastructure. With respect to the 700 MHz public safety band, the Commission found that a state licensing scheme reduces the administrative burden on both the Commission and the public safety community.[240] Because the state licensing approach was used in the **700 MHz** proceeding. we expect that states will have spectrum management capabilities already in place. State licensing, however. has certain potential drawbacks. State licensing would impose additional spectrum management duties upon state agencies. We therefore seek comment on whether this approach places unduly burdensome responsibilities upon the states. **as** well **as** on what alternative licensing mechanism we should employ if a state is unwilling or unable to administer such a license. Hence, we seek comment on whether we should establish guidelines to ensure that **states** do **not** unduly restrict the access of other eligible entities to this spectrum. We **also** seek comment on whether we should license this spectrum **as** was done in the **700 MHz** band, in which **states** were given a window to apply for a state license and at the end of that period, unclaimed spectrum would revert to a Regional Planning Committee. Commenters should specifically address whether such an approach is feasible and appropriate, and if so, what entity should be designated the default licensee in those cases in which a **state** does not file for its license. Commenters should also discuss the other advantages and disadvantages of this scheme, **as** identified herein or otherwise.

50. Another licensing scheme that would allow the designation of a licensee for coordination purposes with minimal administrative burden on end users would be to license public safety DSRC operations **through** the use of regional planning committees. Under a regional planning licensing scheme, which the Commission used in both the **700 MHz** and **800** MHz public safety bands, the nation is divided

(Continued from previous page)
defined EA-like areas. **The** three **additional** EA-like service areas are: (1) **Guam** and the Northern Mariana Islands (combined as one **service** area); **(2) Puerto** Rim and the United States **Virgin** Islands (combined **as** one service area); and **(3) American Samoa**.

[237] *See* **47** C.F.R. § **27.6.** *See also, Parr 2" Report and Order.* **12** FCC Rcd at **10814-16** ¶¶ **54-60**. **AI** the time of the 2.3 **GHz** auction, REAs were defined as Regional Economic *Area* Groupings (REAGs).

[238] *See* Service **Rules** for the 746-764 and 776-794 MHz Bands. and Revisions **to Part 27 of the Commission's** Rules, **WT Docket** No. **99-168.** *First Report and Order.* 15 FCC Rcd **476. 500** ¶ **56** (*700 MHz First Report and Order).*

[239] *See supra* n. **236,**

[240] *See "00 MHz Fourth NPRM,* 15 FCC Rcd at **16909** ¶ **21**

into regions that have the autonomy to develop plans that meet their different communications needs."[241] Based on the experience gained from the implementation of this plan in the 700 MHz and 800 MHz bands, we seek comment on whether we should employ regional planning committee licensing in the 5.9 GHz band. Also, we request comment on whether some of this spectrum should be administered under Part 15, and if so, how much. We note here that the issue of the most appropriate band plan is linked. to a certain extent, to the issue of how we will license the spectrum."[242]

2. On Board Units

51. According to the July Ex *Parte* Comments, "[e]quipping every new vehicle sold in the United States with On-Board Units is a primary goal of DOT and ITS America."[243] As mentioned above, there are *two* types of OBUs, those associated with a specific fixed system and those not associated with a fixed system. ITS America recommends that we propose to license both types of OBUs by rule.[244] ITS America recommends against permitting any unlicensed DSRC operations because the dominant use of the band will be for public safety, which will not be able to tolerate interference.[245] Moreover. ITS America maintains that unlicensed DSRC operations would threaten the integrity of the 5.9 GHz band for its intended purposes.[246]

52. With respect to OBUs associated with a specific fixed system. we seek comment on licensing those OBUs under the associated RSU license. We ask commenters whether an applicant for an RSU license should also request a specific number of OBUs, or whether an RSU license should automatically confer upon the RSU licensee the right to operate an unlimited number of OBUs in connection with its system.

53. For OBUs not associated with a specific fixed system, we seek comment on whether they should be unlicensed under Part 15 or licensed by rule. Below is a description of these two options. Notwithstanding ITS America's concerns, we believe it is appropriate to seek comment on allowing OBUs to operate as unlicensed devices pursuant to Part 15 of the Commission's Rules. Part 15 contains the technical requirements for radiofrequency devices that may be operated without individual licenses.[247] The requirements include radiated emission limits for intentional radiators, such as transmitters, and for unintentional radiators, such as radio receivers. computers. and VCRs.[248] The limits are intended to minimize the possibility of unlicensed Part 15 devices causing interference to licensed radio services.[249] Part 15 of the rules requires that most devices that intentionally emit radiofrequency radiation be certified

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[241] *See 700 MHz First R&O*, 14 FCC Rcd at 190 ¶ 77 *citing 800 MHz R&O*, 3 FCC Rcd at 906

[242] See Part 15 licensing discussion at para. 53. *infra.*

[243] July *Ex Parte* Comments at 45.

[244] *Id.* at 54.

[245] Id. at 58

[246] Id.

[247] Review of Part 15 and Other Parts of the Commission's Rules. ET Docket 01-278, *Notice of Proposed Rulemaking*, 16 FCC Rcd 18205, 18207 ¶ 6 (2001).

[248] *Id.*

[249] *Id.*

before they can be marketed.[250] We note that the Commission's Rules already permit a variety of unlicensed operations in the 5.725-5.875 GHz range."[251] Unlicensed applications under Part 15 may not be appropriate, however, to license OBUs of some DSRC-based ITS applications because the OBUs would have to accept interference from and not cause interference to operations, particularly any service with allocated status such as the Part 90 DSRC-based ITS operations.[252] Nevertheless, as the Commission noted in the Allocation *Report* and Order, "low power unlicensed DSRC could benefit some applications, such as fee collection at parking garages and commercial establishments."[253] We seek comment on whether OBUs not associated with an RSU should be permitted to operate under Part 15.

54. We also seek comment on licensing OBUs by rule. When a service is licensed by rule. no licenses are issued and frequency coordination is generally not used.[254] Licensing by rule must be authorized by Congress, and is appropriate only for low-power. shortdistance services with multiple, shared channels, where users can avoid congestion fairly easily.[255] Congress has authorized, through Section 307(e) of the Act, [256] licensing by rule in the Citizens Band (CB) Radio Service and in the Radio Control Services, among others, not relevant here.[257] Therefore, to use a license by rule scheme to license OBUs not associated with a fixed system, we would be required to classify such OBUs in either the Citizens Band Radio Service or the Radio Control Service. Section 307(e)(3) authorizes the Commission to define the Citizens Band Radio Service and the Radio Control Service, which the Commission has done.[258] The Commission defines the Citizens Band Radio Service as "a private, two-way. short-distance voice communications service for personal or business activities of the general public."[259] In the CB Radio Service, users may transmit communications about their personal or business activities, emergencies, and traveler assistance, but users must limit their communications to the minimum practicable time.[260] The Commission defines the Radio Control Service as "a private, one-way, short distance non-voice communications service for the operation of devices at remote locations."[261] We seek comment on wbether the DSRC service meets the definition of CB service or Radio Control Service. We seek comment on whether licensing by rule would be an appropriate licensing scheme for OBUs not associated with an RSU.

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[250] *Id*. at ¶ 34

[251] See Allocation Report *and Order* at 18234 ¶ 28. See also 41 C.F.R. 15.245, 15.247, and 15.249.

[252] See *Allocation* Report and Order at 18234 ¶ 28.

[253] *Id*. at 18235 ¶ 30.

[254] *BBA NPRM*, 14 FCC Rcd 5206, 5218-5219 ¶ 17.

[255] *Id*

[256] 47 U.S.C. §307(e)(1)

[257] Licensing by rule is also authorized in the aviation radio service and in the maritime radio service See 47 U.S.C. §307(e)(1).

[258] 47 U.S.C§307(e)(3)

[259] 47 C.F.R. § 95.401(a).

[260] *BBA NPRM*, 14 FCC Rcd 5206, 5218-5219 ¶ 17.

[261] 47 C.F.R. § 95.201.

3. Treatment of Incumbent Services

55. Fixed Satellite Service. In its comments to the *Allocation NPRM*, DOT indicated that an allocation of seventy-five megahertz of spectrum was necessary for DSRC operations because of the potential of two incumbents, high power military radar systems and Fixed Satellite Service (FSS) uplinks. to interfere with, and therefore impede the reliability of DSRC operations.[262] DOT indicated that FSS uplinks "suggest a potential interference range of several hundred miles."[263] Only by allocating the full seventy-five megahertz for DSRCS, DOT stated, would assure "compatibility with primary incumbent users."[264] Accordingly, in allocating the 5.9 GHz band for DSRC operations the Commission noted in part, that seventy-five megahertz of spectrum "will provide the flexibility needed to share the spectrum with incumbent operations."[265] The Commission further found that DSRC operations would be compatible with FSS u p l i because FSS earth stations typically use highly directional antennas pointed towards the geostationary orbital arc, whereas DSRC operations would typically be pointed towards a highway and operate at relatively low power.[266] The Commission further noted that it may be necessary in some cases for DSRC operations to avoid an area near an incumbent FSS earth station in order to avoid the high-powered earth station transmission."[267] Nonetheless the Commission concluded that spectrum sharing is feasible because of the limited number of FSS earth stations and their use of highly directional antennas.[268] The Commission further concluded that it did not anticipate that prior coordination would be necessary between DSRC and FSS operations.[269]

56. On December 27, 1999, PanAmSat filed a Petition for Reconsideration or Clarification of the *Allocation Report and Order* concerning the Commission's statements on whether prior coordination is needed between DSRC operations and FSS systems.[270] PanAmSat stated:

> [t]he Commission appears to believe that the only coordination issue raised by a DSRC allocation in the FSS bands relates to whether interference could prevent DSRC systems from locating near incumbent FSS uplinks. In fact, however, absent a coordination procedure the widespread deployment of DSRC terminals could give rise to broad exclusion zones within which FSS operators could not deploy new earth stations. Among other things, such exclusion zones could prevent teleport operators from expanding their operations at sites in which they already have invested millions of dollars.

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[262] DOT Comments at 2

[263] *Id.*

[261] United States Department of Transportation Reply Comments to ET Docket No. 98-95 at 3. DOT further cited an ARINC study that "in order to avoid potential interference from incumbent users in the 5.9 GHz band an allocation of 75 MHz" was necessary "as a practical matter." *Id.* at 2

[265] *Allocation* Report *and Order,* 14 FCC Rcd at 18225 ¶ 9.

[266] *Id.* at 18228 ¶ 15.

[267] *Id.*

[268] *Id.*

[269] *Id.*

[270] PanAmSat Corporation. Petition for Reconsideration or Clarification (filed Dec. 27. 1999) (PanAmSat Petition).

> PanAmSat is not wedded to any particular method for coordinating DSRC and FSS stations. It is PanAmSat's understanding, however, that the DSRC industry is at an embryonic stage, and one possibility would be for DSRC systems to be developed taking into account the 'noise floor' that is present from FSS uplink operations. FSS and DSRC stations then could be located without having to engage in site-by-site coordination.'"

The Satellite Industry Association (SIA)[272] filed in support PanAmSat's petition. SIA stated that

> [b]ased on the technical rules adopted by the Commission, it appears unlikely that DSRC systems will cause significant interference to FSS uplink operations. However, if sited in proximity to an FSS earth station, DSRC systems may well receive harmful interference from FSS uplinks. This not only could inhibit the deployment of DSRC stations. but it also could lead to band sharing disputes when FSS earth station operators expand or modify their facilities."

57. Although ITS America believes that prior coordination of "all DSRC-based ITS and FSS operations is likely not necessary and, indeed would be unduly burdensome and costly."[274] we agree with PanAmSat that the widespread deployment of DSRC terminals could limit where new FSS earth stations can be located. Therefore, we seek comment on whether prior coordination would be necessary and, if so, under what conditions. For example, should all new FSS earth stations be prior-coordinated with DSRC operations (except for new earth stations to be located at existing earth station teleport sites)? If some type of prior coordination is necessary or appropriate, commenters should address how to accomplish such coordination with minimal burden and cost, especially considering the mobile nature of the DSRC service. In light of incumbent and potential future FSS operations, commenters also are asked to address whether the ASTM-DSRC Standard would provide for robust and reliable DSRC operations. In this connection, we seek information on whether DSRC equipment and operations should rake into account the "noise floor" that is present from FSS uplink transmissions. If such approach were taken, commenters should indicate whether the current DSRC standards are adequate and, if not. what changes would be necessary to those standards to allow sharing of this spectrum without any coordination. Of particular interest is whether FSS uplink transmissions in the 5.9 GHz band would interfere with the DSRC Control Channel."'

58. In the Allocation Report and Order the Commission stated that sharing between DSRC operations and Government operations was possible if proper coordination was performed. Accordingly, Section 90.371(b) of the Rules requires that DSRC stations operating in the 5.9 GHz band "shall not receive protection from Government Radiolocation services in operation prior to the establishment of the DSRCS station."[276] Section 90.371(b) further requires that "[o]peration of DSRCS stations within 75

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[271] Id. at 2

[272] Comments of Satellite Industry Association. ET Docket No. 98-95 (supporting PanAmSat Petition)

[273] Id. at 2.

[274] Comments of ITS America. ET Docket No. 98-95 (opposing PanAmSat Petition).

[275] As noted in para. 3, supra. we dismiss PanAmSat's Petition for Reconsideration or Clarification as moot because we are addressing the issues raised in that petition in this service rules *Notice*

[276] 47 C.F.R§ 90.371(b).

kilometers of the location listed in the table accompanying to Section 90.371(b) "must be coordinated through the National Telecommunications and Information Administration."[277] New government radar installations that may be deployed subsequent to DSRC implementation must coordinate with incumbent DSRC operations.[278] One issue not addressed in the *Allocation Report and Order* is whether specific provisions need to be adopted to forestall interference from new high power Government radar operations to the DSRC Control Channel. We therefore seek comment on this issue.

F. Grant of Licenses

59. The Balanced Budget Act of 1997[279] (BBA-97) revised and expanded the Commission's auction authority.[280] Specifically, it amended Section 309(j) of the Communications Act to require the Commission to grant licenses through the use of competitive bidding when mutually exclusive applications for initial licenses are filed, unless certain specific statutory exemptions listed in Section 309 (j)(2) apply.[281] BBA-97 also added to Section 309(j)(1) a reference to the Commission's obligation under Section 309(j)(6)(E) to use engineering solutions, negotiation. threshold qualifications. service regulations, or other means to avoid mutual exclusivity where it is in the public interest to do so.[282] BBA-97 did not amend Section 309(j)(3)'s directive to consider certain public interest objectives in identifying classes of licenses and permits to be issued by competitive bidding.[283]

60. In the ***BBA Report and Order,*** the Commission established a framework for exercise of its auction authority, as amended by the Balanced Budget Act.[284] The ***BBA Report and Order*** affirmed that, in identifying which classes of licenses should be subject to competitive bidding, the Commission is required to pursue the public interest objectives set forth in Section 309(j)(3).[285] The ***BBA Report and Order*** also affirmed that, as part of this public interest analysis, the Commission must continue to consider alternative procedures that avoid or reduce the likelihood of mutual exclusivity.[286] The Commission concluded, however, that its obligation to avoid mutual exclusivity does not preclude it from

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[277] ***Id.***

[278] *Allocation Report and Order*, 14 FCC Rcd 18221.18228 ¶14

[279] Pub. L. 105-33, 111 Stat. 251 (1997)

[280] *See* 47 U.S.C. § 309(j)(1), (2) (as amended by Balanced Budget Act, § 3002).

[281] ***Id.*** 47 U.S.C. § 309(j)(2) exempts from auctions Licenses and construction permits for public safety radio services. digital television service licenses and permits given to existing terrestrial broadcast licensees to replace their analog television service licenses. and licenses and construction permits for noncommercial educational broadcast stations and public broadcast stations described in § 397(6) of the Communications Act, 47 U.S.C. § 397.

[282] *See* 47 U.S.C. §§ 309(j)(1), 309(j)(6)(E).

[283] *See* 47 U.S.C. § 309(j)(3).

[284] *See BBA Report and Order,* 15 FCC Rcd at 22709

[285] *Id.* at 22718-22723.

[286] Id.